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ABSTRACT

The National Science Teachers Association (NSTA) policy statement on multiculturalism lists learning style as an important concern for science teachers. Several recent studies have considered the learning styles of minority children. Notable among them is the study of J. Hale (1986) that lists a number of characteristics of African-American children's learning styles. Young African-American children are perceived as successful in their homes, churches, and communities and only demonstrate a failure pattern after a few years in schools designed by the dominant culture. African-American children display culturally induced cognitions that should be considered in planning for their instruction. Four learning styles described by Hale and others are: (1) person centered; (2) affective; (3) expressive; and (4) movement oriented. Researchers are engaged in evaluating these learning styles in relation to the Myers Briggs Type Indicator, and they seem very promising for describing the learning styles of African-American children. Two tables provide instruction strategies for science based on characteristics of African-American children and seven additional tables summarize study information. (Contains 12 references.) (SLD)

Learning Styles of African American Children

and

NSTA Goals of Instruction

by

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Abstract

Learning Styles of African American Children and NSTA Goals of Instruction

Presented to AERA & NARST Annual Meetings
San Francisco, 1995

by
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The National Science Teachers Association (NSTA) policy statement on multiculturalism (1991) lists learning style as an important concern for science teachers. A recent summary in Science and Children (January, 1992, p. 6) states that racial and ethnic diversity will increase in school populations to one third of the total by 1995. Atwater (1989) examined the need for science teachers to become multicultural; she says that while minority student populations are increasing, the number of minority teachers is decreasing. Historically, science educators have called for science teachers to use learning style information to improve instruction (McCaulley, 1977; Kuerbis, P., 1988; Bonnstetter, R., Horne, S., & McDonald, D.,1991). Claxton & Murrell (1987) say that the most important need in learning style research is to identify the learning styles of minority children. Hale, (formerly Hale-Benson,1986) lists a number of characteristics of the learning styles of African American children in her book Black children: Their roots, culture, and learning styles. Hale, an early childhood educator, focuses on the cultural conflict met by children at school, after leaving their cultural milieu of home. According to Hale, young African American children are perceived as successful in their homes, churches, and communities. A failure pattern is evident only after a few years in a school designed by and for the dominant culture. Schools are designed around EuroAmerican or Western values that are in some ways alien to the African way of life. Hale lists traits of African American children which she says are derived from the African culture. She says these traits are *culturally induced cognitions*. Furthermore she says that schools should pay attention to the cultural cognitions of African American children and that school achievement will improve if they do. Four learning styles described by Hale and others are Person-centered, Affective, Expressive, and Movement-Oriented. Person-centered is similar to

Field-dependence, Affective is similar to the Feeling dimension of the Myers-Briggs Type Indicator (MBTI), Expressive has elements of Extroversion and Verve, described by Boykin, and finally, Movement-oriented has elements similar to the Sensing-Perceiving Temperament described by Kiersey and Bates, also based on the MBTI. Preliminary data support some of these comparisons as measured by the MBTI. In addition, MBTI experts are engaged in assessing the styles described by Hale for validity. In summary, there is a large body of accumulated material which describes learning styles of African American children. Hale's work is actually a compilation and a review of the work of many other researchers, in addition to her own. The four styles presented in this study are the ones most salient for science instruction and represent much agreement among African American researchers on learning styles. Science teachers have the motivation and desire to serve all children. The author hopes to engage other researchers from different backgrounds to comment on their agreement or disagreement with the application of cultural learning styles to establish goals of instruction and with the use of existing instruments to measure them.

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_____. (1992). Increasing ethnic diversity. Science and Children, (29), 4:6.

Shade, B. (1982). Afro-American cognitive style: A variable in school success. Review of Educational Research, (52), 2:219-244.

Woolfolk, A. (1988). Educational psychology. Englewood Cliffs: Prentice Hall.

What are the culturally induced cognitions of African American children presented by Hale-Benson?

Hale presents lists of cultural learning styes from numerous researchers; however, only the ones which are the most important for science learning will be presented. Table 1 is presented to describe more fully how these learning styles can be used in a classroom and how they can be used to meet the goals of NSTA. Table 2 gives a specific curriculum example of **plants** which correlates styles with NSTA goals. Table 2 is only one of many that could be developed by teachers, varying only the science topic.

Person centered. African American children have been described by some researchers as Field-Dependent (Shade,1982). Field dependent persons, in general, are more affected by criticism, have greater difficulty learning unstructured material, and may need more explicit instruction on how to solve problems (Woolfolk, 1988, p.152-154). Person-centered describes similar characteristics of field dependence. Person centered children look to the teacher for more direct instruction than do children who get clues from the "field" of the spoken and written language. Children who are person centered look to the person in authority for social cues for behavior. They frequently have to be told what the central point is, when given many. They are more likely to overlook cues which are spoken, unless given directly to them. Text given cues are frequently overlooked. In science class, teachers who talk directly to students will be most effective with African American children. In addition, teachers who elicit from children their previous personal knowledge of a topic will engage the person-centered child.

Teachers will have success with person-centered children by using lots of everyday examples from the childrens' lives. It is very important for teachers to understand how the regular examples in textbooks may be a culturally different example that the children cannot relate to. That is why teachers should rely heavily on childrens' own voices to provide the examples without correction from the teacher's experience or the textbook example. The teacher can slowly build on the child's example to provide additional examples; the point here is not to invalidate whatever the child speaks by the immediate replacement of a teacher-given example.

Because children who are person-centered look to persons in authority for cues to social behavior, it is important for those persons, teachers, to allow children to speak in their own voice, in order to develop their voice, rather than adopt the voice of the teacher.

Affective. African American children are more feeling oriented than white children. They hold values and personal belief systems as more important than logic and abstractions. They like working in cooperation more than in the competitive mode. African culture promotes the community above the individual. Therefore, teamwork and cooperative learning can be a method of science instruction, especially in the early grades. Because schooling becomes more and more impersonal and less affective as children proceed from K-12, the more feeling oriented child may feel a sense of isolation that leads to dropping out of school. Indeed, Barnes (1992) reports from African American high school males who dropped out of school that things that might have prevented them from dropping out were teachers who gave them more attention, compliments and extra help with their schoolwork. Those were three of only five techniques listed by the dropouts. All three techniques would have strong appeal to children with affective and person-centered learning preferences. In addition, in the world of science, the need for feeling oriented individuals with personal values held strongly has never been greater. Societal issues and environmental concerns will be better addressed when these types of individuals have input in science and environmental policy. Only now are we realizing the neglect of considering personal values of all citizens. Examples are charges of environmental racism by placement of toxic

industries and dumps on lands populated by African and Native Americans. Teachers who focus on conservation issues and who allow children multiple opportunities to voice their personal beliefs will meet the needs of children who are affective. Role playing and non-competitive and open-ended experimentation will be appropriate for children with affective learning preferences.

Expressive. Hale says African American people place a high value on unique expression. Members of a black community often spend time developing a style of expression in both language and dress that is singularly theirs. Unique expression is valued by the entire black community. The contrasting trait among EuroAmericans is compliance. Hale says that white children have a high tolerance for monotony, whereas black children do not. While the expressive trait described by Hale is an asset and a vital element of learning in science, compliant behavior stifles science learning. Expressiveness contains components of both objectivity and intellectual honesty. For example, objectivity as a hallmark of traditional science demands a skeptical and sometimes unpopular response, an honesty which could be viewed by some as "outside the norm". In fact, much "real" science has been viewed this way, historically. It seems that if African American children have a culturally induced propensity for expressiveness, an expressiveness that is not shaped by the dominant culture, that that characteristic has much to offer science. The only thing missing could be the empowerment of those children to participate because their expressiveness and desire for uniqueness possibly has been viewed historically as too different to be recognized as being of value. However, in the reexamination of the meaning of cultural plurality, all voices have value and should inform teaching.

Minorities (and girls) have been observed not speaking out in class as much as white male students. Therefore, if teachers encourage the expressivity which young black children bring with them, perhaps more of them will be attracted to science, because their natural learning style is to express themselves. Traditional ways of controlling children's behavior by disallowing their expressiveness may in fact be discouraging them from choosing science as a career later in their lives.

Children with the expressive learning style need plenty of opportunities to choose how they prefer to work: either alone sometimes or with small groups. Because of their need for unique expression, creative endeavors are especially encouraged. Opportunities to invent products will be especially welcomed, as will the exposure to role models in science - videos and books which show African American scientists.

Movement oriented. African American children are raised in a household where restrictions on their movements are not nearly as commonplace and restrictive as in white homes. Continual and continuous movement is tolerated to the point of encouragement in developing body expressiveness. People flow in and out of African American peoples' homes; dialogue is continuous and overlapping; the radio and TV are on. In short, stimuli are numerous and movement is a part of that stimuli. Movement is a way of life. It is not happenstance that one of the traditional words to describe black people is "rhythm." In science class, it is recommended that children move and adventure around in an exploration of nature or while designing an experiment. Actually, movement should be encouraged as a naturally occurring event during most science activities. Numerous in class and outdoor activities can provide for movement needs, as listed in Tables 1 and 2.

Teachers who allow such free movement, who talk directly to the children, and who allow them to talk expressively and to sharing affective needs will be providing appropriate science lessons for African American children. Teachers who use concrete objects rather than pictures, who provide direct experiences with science materials, and who allow children to move around and talk with other children will be providing appropriate educational experiences for African American children.

Table 1
Strategies for Instruction in Science

Characteristics of African American Children Relational Learning Style (Hale-Benson, 1986)

NSTA Goals of Science Education	Person Centered	Affective (similar to MBTI "F", Myers, 1980)	Expressive	Movement Oriented (similar to "SP" temperament of Kiersey & Bates, 1984)
Personal Use	Analogies of everyday situations	Choices of way to use science time	Opportunities to work alone or with others to complete a task Creativity opportunities	Experiments: Teacher directed open or closed ended or student directed, open-ended Inventing activities
Societal Issues	Conservation of resources K-6 Environmental ethics and action 7-12	Oral opportunities to tell about personal knowledge of nature, natural resources	Group discussions Mural development	Debates Arts & Crafts Inventions
Career Awareness	Guest speakers	Role play careers (need costumes)	Books & Videos of African Americans in science	Visit science places: labs, museums, nature centers, natural areas.
Academic Knowledge	Student involvement preceding verbal or text introduction to topic (Learning cycle, Lawson et al. 1989)	Experiments, open-ended, non-competitive	Discussions one-on-one or group Experiments Inventions	Experiments, open or closed ended Choices among several options in order to obtain credit

Hale-Benson, J. (1986). Black children: Their roots, culture, and learning styles. Baltimore: The Johns Hopkins University Press.

Keirsey, D. & Bates, M. (1984). Please understand me. (5th ed.). Del Mar: Prometheus Nemesis. This book explains temperament theory based on the type theory of Myers, (1980) and Jung (1921).

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NSTA=National Science Teachers Association. The goals are described in an ERIC document, Project Synthesis, No. 2, 1981. ERIC Clearinghouse for Science, Mathematics, and Environmental Education, The Ohio State University, 1200 Chambers Rd., Columbus, Ohio 43212.

Table 2
Curriculum Example, Topic: Plants
Primary Grades

	Characteristics of African American Children Relational Learning Style (Hale-Benson, 1986)			
NSTA Goals of Science Education	Person Centered	Affective (similar to Myers "F", 1980)	Expressive	Movement Oriented (similar to "SP" temperament of Kiersey & Bates, 1984)
Personal Use	Use pictures & live plants to elicit prior plant experience	Tell and let children tell or write about gardening & other plant experiences	Work alone or in groups on plant experiments	Go outside to observe plants. Act out the role of plants in everyday life. Collect plant parts: seeds, buds of trees, leaves.
Societal Issues	Conservation theme: rain & ancient forests. What can I do to help? Project WILD	Oral/written I care about trees. What trees mean to me. Oral (E_F_) Written (I_F_)	Class discussion following video on either rain or ancient forests.	Plant a tree. Clean up a natural area, perhaps around the school Sing & dance to songs about plants, which the children have composed. Perform plays which the children write about plants' reaction to pollution.
Career Awareness	Guest speakers: florist, nursery worker, extension service horticulturalist, farmer, botanist	Stories oral or written: Why I want to be a ...	Keep a plant notebook. Include poems, songs, stories, & experiments Encourage the children to share	Experiments and Arts & Crafts with plant themes. Ask the children to mimic, or role play jobs that involve plants. Need props.
Academic Knowledge	***Exploration*** with plant for each child. ***Term Introduction*** & **Application***	Design an Experiment Keep a notebook	Discussion on role of plants in nature. Encourage all to respond. Group project: write a book or paint a mural	Experiments: Plant seeds, vary soil, seeds, light. Repeat until children observe patterns. Experiment directed by the children, open-ended.

*Steps in Learning Cycle (Lawson et al, 1989)

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TABLES

Table 1

Myers-Briggs Type Indicator Preferences*

% in General Population

EXTRAVERSION (75)	Energy Direction	INTROVERSION (25)
Sociable/likes group activity		Reserved
Talkative		Needs privacy
Psychomotor activity		Needs time for internal processing
Thinks out loud		Reflects, and then (maybe) acts
Acts, and then (maybe) reflects		Likes reading, reflecting
Needs relationships		Likes working alone
Expresses emotions		
SENSING (75)	Perception of Reality	**INTUITION** (25)
Notices the specific		Notices patterns & relationships
Observant		Misses details
Lives in present		Looks to future
Facts		Hunches
Prefers practical matters		Prefers imagining possibilities
Likes definite measurable things		Likes to be inventive
Starts at beginning, takes one step/time		Jumps in anywhere, leaps/steps
THINKING (60 Male 40 Female)	Decision Making	**FEELING** (~~40~~ 60 Female ~~60~~ 40 Male)
Logical		Goes by personal convictions
Objective/Sees things as an observer		Sees things as a participant
Decides with head		Decides with heart
Concerned for truth, justice		Concerned for relationships, harmony
Takes long view		Takes immediate, personal view
Finds flaws, criticizes		Spontaneously appreciates
JUDGING (50)	Lifestyle	**PERCEIVING** (50)
Decisive, planned & orderly		Spontaneous, flexible, & adaptable
Prefers an organized lifestyle		Prefers a flexible lifestyle
Likes definite order and structure		Likes going with the flow
Likes to have things under control		Likes to experience life as it happens
Makes lists, checks things off		Makes list, may lose it
Enjoys being decisive		Enjoys being curious, discovering surprises
Likes clear limits and categories		Likes freedom to explore without limits
Likes closure		Likes to leave things open
Handles deadlines, plans in advance		Meets deadlines by last minute rush
J's may seem demanding, rigid, uptight to P's		P's may seem disorganized, messy, irresponsible to J's

Adapted from Earle C. Page. p. 15. Center for Application to Psychological Type 1991 catalog. 1-800-777-2278. Looking at Type.

Table 2

TEMPERAMENT THEORY

Characteristics of the SP, SJ, NT and NF (% in general population).

ISTP,ESTP,ISFP,ESFP **SP, Dionysian** "Freedom" (38%)	ISFJ,ESFJ,ISTJ,ESTJ **SJ, Epimethean** "Useful" (38%)
Action-oriented, Doers	Belonging is important
Impulsive, leaps before looks	Giver, desire to serve
Do well in crises, stamina	"Supposed to do", parental
Love using tools(from chisel to scalpel)	Feels obligated, work ethic
Free spirit	Believes in hierarchy
Exciting, Optimistic, cheerful	Theme of pessimism
light-hearted & fun	"Be prepared" (boy scout) -
Like jokes & variety	Chicken Little
View goals differently, process oriented	Fundamentals/Antecedents
Many virtuosos of art, entertainment	
and adventure	Extremely responsible
Great painters, vocalists, dancers,	Vulnerable to depression
photographers, athletes, hunters	Pillars of society
Construction, heavy machinery,	Business, education,
aircraft, entrepreneurs,	pharmacy, secretary,
police	accounting, dentistry

INTP,ENTP,INTJ,ENTJ **NT, Promethean(12%)** "Desire for Power for Competence"	INFJ,ENFJ,INFP,ENFP **NF, Apollonian (12%)** "Search for Self"
Capable, able	Understands others, sometimes misunderstood
Ruthless self-criticism, self-doubting	Who am I? Seeks self-actualization
Must be competent, monitors progress	Needs recognition & meaning
in skill & knowledge acquisition	Strives for integrity, authenticity
Questions authority	Wants to "make a difference"
Individualistic, intellectual "Eccentric genius"	"To be or not to be " Hamlet
Communicates abstractly sometimes	Wield tremendous influence because
Recreation-skill improvement	professions they choose:
Expects others to achieve, can be demanding	Writers, Journalists, dramatists
Passion for knowing - "Work is play &	They inspire & persuade,"Causes"
play is work"	Seek relationships, interaction
Focus on future, preoccupied	Psychiatry, psychology, teaching,
Scientific principles, Engineering	ministry, Peace corp
Architecture, math/science teaching,	Empathy, sometimes unrealistic
management, criminology,	Places too large time demands on self
cardiology, philosophy	for others

Adapted from Keirsey and Bates (1984)

African American

Source of data

Susan Richardson
Goldsboro, North Carolina
Spring 1991

Sixth Grade
Dillard School
MMTIC

N = 214

MBTI Type Table
Center for Applications
of Psychological Type

Legend: % = percent of total choosing this group who fall into this type. I = Self-selection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ *	ISFJ	INFJ	INTJ
N= 9	N= 9	N= 1	N= 1
%= 4.21	%= 4.21	%= 0.47	%= 0.47
I= 0.30	I= 0.51	I= 0.32	I= 0.19
ISTP "	ISFP	INFP "	INTP
N= 7	N= 16	N= 11	N= 3
%= 3.27	%= 7.48	%= 5.14	%= 1.40
I= 0.40	I= 1.56	I= 5.35	I= 0.29
ESTP	ESFP #	ENFP *	ENTP
N= 15	N= 34	N= 29	N= 11
%= 7.01	%= 15.89	%= 13.55	%= 5.14
I= 0.56	I= 2.36	I= 4.03	I= 1.19
ESTJ "	ESFJ *	ENFJ	ENTJ
N= 18	N= 40	N= 8	N= 2
%= 8.41	%= 18.69	%= 3.74	%= 0.93
I= 0.56	I= 2.43	I= 1.94	I= 0.24

			N	%	I	
J	E	E	157	73.36	1.33	*
U	I	I	57	26.64	0.60	*
D I	G N	S	148	69.16	0.90	
G N	I T	N	66	30.84	1.34	
I T	N R	T	66	30.84	0.48	*
N R	G O	F	148	69.16	1.97	*
G O	V	J	88	41.12	0.76	#
V	P E	P	126	58.88	1.29	#
P E	E R	IJ	20	9.35	0.36	*
E R	R T	IP	37	17.29	0.92	
R T	C S	EP	89	41.59	1.54	#
C S	E	EJ	68	31.78	1.12	
E	P	ST	49	22.90	0.46	*
P	T	SF	99	46.26	1.69	*
T	I E	NF	49	22.90	2.98	*
I E	V X	NT	17	7.94	0.52	"
V X	E T	SJ	76	35.51	0.79	
E T	S R	SP	72	33.64	1.04	
S R	A	NP	54	25.23	1.87	#
A	J V	NJ	12	5.61	0.58	
J V	U E	TJ	30	14.02	0.40	*
U E	D R	TP	36	16.82	0.56	#
D R	G T	FP	90	42.06	2.65	*
G T	I S	FJ	58	27.10	1.41	
I S	N	IN	16	7.48	0.78	
N	G	EN	50	23.36	1.74	#
G		IS	41	19.16	0.55	*
		ES	107	50.00	1.20	

Note concerning symbols following the selection ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Table 3

Base population used in calculating selection ratios:
Eleventh Grade, Goldsboro High School--MBTI
Base total N = 208. Sample and base are independent.

African American

* * * * Calculated values of Chi-square or Fisher's exact probability * * * *.
Type table order

				E 15.0430	IJ 20.1381	SJ 3.7164	IN 0.6183	
12.2039	2.8718	0.3662	0.1176	I 15.0430	IP 0.1523	SP 0.0981	EN 6.8654	
				S 3.2250	EP 10.0588	NP 9.3370	IS 13.5882	
4.7255	1.2996	0.0207	0.0508	N 3.2250	EJ 0.5831	NJ 2.4177	ES 2.8368	
				T 49.0637	ST 32.4388	TJ 25.3979		
3.6252	8.7739	14.0252	0.1545	F 49.0637	SF 16.0978	TP 9.9752		
				J 7.3741	NF 18.7143	FP 35.0354		
4.3324	11.0879	0.3813	0.0591	P 7.3741	NT 5.6900	FJ 3.6660		

Source of data

Form G
Science Students,Southeast Halifax High School Halifax,NC, Collected by Flora Pitchford, Grad. East Carolina Univ.

Group tabulated:

College Prep & Applied/Technical Physical Science & Biology Students

N = 134

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type. I = Self-selection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ	ISFJ "	INFJ	INTJ *
N= 11	N= 6	N= 3	N= 1
%= 8.21	%= 4.48	%= 2.24	%= 0.75
I= 1.48	I= 2.63	I= 0.36	I= 0.04
ISTP #	ISFP *	INFP #	INTP *
N= 11	N= 12	N= 2	N= 4
%= 8.21	%= 8.96	%= 1.49	%= 2.99
I= 3.22	I= 4.21	I= 0.18	I= 0.17
ESTP *	ESFP *	ENFP	ENTP
N= 15	N= 16	N= 8	N= 8
%= 11.19	%= 11.94	%= 5.97	%= 5.97
I= 6.58	I= 84.18	I= 0.77	I= 0.53
ESTJ *	ESFJ #	ENFJ	ENTJ "
N= 22	N= 7	N= 3	N= 5
%= 16.42	%= 5.22	%= 2.24	%= 3.73
I= 8.90	I= 4.60	I= 0.58	I= 0.36

		N	%	I
J	E	84	62.69	1.65 *
U	I	50	37.31	0.60 *
D I	S	100	74.63	4.46 *
G N	N	34	25.37	0.30 *
I T	T	77	57.46	0.84 "
N R	F	57	42.54	1.36 "
G O	J	58	43.28	0.89
V	P	76	56.72	1.11
P E	IJ	21	15.67	0.50 *
E R	IP	29	21.64	0.71 "
R T	EP	47	35.07	1.68 *
C S	EJ	37	27.61	1.61 #
E	ST	59	44.03	3.79 *
P	SF	41	30.60	5.99 *
T	NF	16	11.94	0.46 *
I E	NT	18	13.43	0.23 *
V X	SJ	46	34.33	3.36 *
E T	SP	54	40.30	6.18 *
S R	NP	22	16.42	0.37 *
A	NJ	12	8.96	0.23 *
J V	TJ	39	29.10	0.81
U E	TP	38	28.36	0.86
D R	FP	38	28.36	1.55 #
G T	FJ	19	14.18	1.10
I S	IN	10	7.46	0.15 *
N	EN	24	17.91	0.54 *
G	IS	40	29.85	2.51 *
	ES	60	44.78	9.28 *

TABLE 4

Note concerning symbols following the selection ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Base population used in calculating selection ratios:
College Science Students, fig 15 (N=705) Myers, Gifts Differing, p. 43 (Males)
Base total N = 705. Sample and base are independent.

* * * * Calculated values of Chi-square or Fisher's exact probability * * * *
Type table order

				E	28.1453	IJ 13.9056	SJ 54.1794	IN 83.2778
1.4399	4.1316	0.0664	0.0000	I	28.1453	IP 4.1545	SP122.3400	EN 12.3471
				S	196.2023	EP 12.8148	NP 37.4246	IS 28.7589
10.7933	16.8526	0.0051	0.0000	N	196.2023	EJ 8.0424	NJ 44.1368	ES180.6674
				T	6.5377	ST 84.5347	TJ 2.2825	
32.5719	0.0000	0.5437	3.3208	F	6.5377	SF 87.7751	TP 1.0679	
				J	1.3702	NF 12.4334	FP 7.1482	
59.8254	10.7226	0.4558	0.0219	P	1.3702	NT 86.1315	FJ 0.1597	

Source of data

Form G
Science Students, Southeast Halifax High School Halifax, NC, Collected by Flora Pitchford, Grad. East Carolina Univ.

Group tabulated:

Regular Science Students (Males and Females) Southeast Halifax High, 1990-91

N = 134

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type. I = Self-selection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ	ISFJ	INFJ	INTJ
N= 11	N= 6	N= 3	N= 1
%= 8.21	%= 4.48	%= 2.24	%= 0.75
I= 1.13	I= 0.47	I= 0.94	I= 0.46
ISTP "	ISFP	INFP	INTP
N= 11	N= 12	N= 2	N= 4
%= 8.21	%= 8.96	%= 1.49	%= 2.99
I= 2.12	I= 1.43	I= 0.36	I= 0.84
ESTP "	ESFP	ENFP "	ENTP
N= 15	N= 16	N= 8	N= 8
%= 11.19	%= 11.94	%= 5.97	%= 5.97
I= 1.79	I= 1.49	I= 0.48	I= 1.09
ESTJ #	ESFJ "	ENFJ	ENTJ
N= 22	N= 7	N= 3	N= 5
%= 16.42	%= 5.22	%= 2.24	%= 3.73
I= 1.91	I= 0.48	I= 0.40	I= 0.90

		N	%	I	
J	E	84	62.69	1.02	
U	I	50	37.31	0.97	
D I	S	100	74.63	1.23	#
G N	N	34	25.37	0.64	#
I T	T	77	57.46	1.41	*
N R	F	57	42.54	0.72	*
G O	J	58	43.28	0.86	
V	P	76	56.72	1.14	
P E	IJ	21	15.67	0.75	
E R	IP	29	21.64	1.21	
R T	EP	47	35.07	1.09	
C S	EJ	37	27.61	0.94	
E	ST	59	44.03	1.69	*
P	SF	41	30.60	0.88	
T	NF	16	11.94	0.49	#
I E	NT	18	13.43	0.90	
V X	SJ	46	34.33	0.95	
E T	SP	54	40.30	1.65	*
S R	NP	22	16.42	0.64	"
A	NJ	12	8.96	0.65	
J V	TJ	39	29.10	1.34	
U E	TP	38	28.36	1.48	"
D R	FP	38	28.36	0.92	
G T	FJ	19	14.18	0.50	*
I S	IN	10	7.46	0.64	
N	EN	24	17.91	0.65	"
G	IS	40	29.85	1.11	
	ES	60	44.78	1.33	"

TABLE 5

Note concerning symbols following the selection ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Base population used in calculating selection ratios:
Non-major Undergraduates In Biology-----Dr. C. Melear Dissertation
Base total N = 673. Sample and base are independent.

* * * * Calculated values of Chi-square or Fisher's exact probability * * * *
Type table order

				E	0.0822	IJ	1.8420	SJ	0.1803	IN 2.0822
0.1399	3.5720	1.0000	0.7017	I	0.0822	IP	1.0782	SP	14.3831	EN 5.4923
				S	9.3948	EP	0.4516	NP	5.1116	IS 0.4911
4.8240	1.3188	0.2076	0.8060	N	9.3948	EJ	0.1496	NJ	2.3354	ES 5.9506
				T	12.5228	ST	17.6386	TJ	3.4732	
4.1769	2.1639	4.5219	0.0474	F	12.5228	SF	0.8070	TP	5.7512	
				J	2.0622	NF	10.1597	FP	0.3043	
7.6126	3.9565	0.1301	1.0000	P	2.0622	NT	0.1820	FJ	11.7072	

Source of data

Form G
High School Students of Eastern North Carolina
Collected by F. Pitchford, S. Richardson, and others
Easr Carolina University

Group tabulated:

African-American High School Students Eastern North Carolina, 1990-91

N = 452

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type.
I = Self-selection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ *	ISFJ	INFJ	INTJ
N= 54	N= 27	N= 6	N= 9
%= 11.95	%= 5.97	%= 1.33	%= 1.99
I= 1.97	I= 1.12	I= 0.57	I= 0.64
ISTP #	ISFP "	INFP #	INTP
N= 31	N= 32	N= 8	N= 19
%= 6.86	%= 7.08	%= 1.77	%= 4.20
I= 1.65	I= 1.46	I= 0.35	I= 0.95
ESTP *	ESFP	ENFP #	ENTP
N= 56	N= 42	N= 24	N= 24
%= 12.39	%= 9.29	%= 5.31	%= 5.31
I= 2.01	I= 1.01	I= 0.58	I= 0.86
ESTJ	ESFJ *	ENFJ	ENTJ
N= 66	N= 26	N= 11	N= 17
%= 14.60	%= 5.75	%= 2.43	%= 3.76
I= 1.07	I= 0.50	I= 0.58	I= 0.81

		N	%	I	
J	E	266	58.85	0.91	"
U	I	186	41.15	1.17	"
D I	S	334	73.89	1.21	*
G N	N	118	26.11	0.67	*
I T	T	276	61.06	1.26	*
N R	F	176	38.94	0.75	*
G O	J	216	47.79	0.94	
V	P	236	52.21	1.06	
P E	IJ	96	21.24	1.26	"
E R	IP	90	19.91	1.08	
R T	EP	146	32.30	1.05	
C S	EJ	120	26.55	0.78	#
E	ST	207	45.80	1.52	*
P	SF	127	28.10	0.91	
T	NF	49	10.84	0.52	*
I E	NT	69	15.27	0.83	
V X	SJ	173	38.27	1.05	
E T	SP	161	35.62	1.46	*
S R	NP	75	16.59	0.67	*
A	NJ	43	9.51	0.67	#
J V	TJ	146	32.30	1.18	"
U E	TP	130	28.76	1.37	*
D R	FP	106	23.45	0.83	"
G T	FJ	70	15.49	0.66	*
I S	IN	42	9.29	0.62	#
N	EN	76	16.81	0.69	*
G	IS	144	31.86	1.56	*
	ES	190	42.04	1.04	

Note concerning symbols following the selection ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Table 6

Base population used in calculating selection ratios:
High-School Students, College Prep, Fig. 5 p.33 and Fig. 7,p.35 Gift Differing
Base total N = 4758. Sample and base are independent.

* * * * Calculated values of Chi-square or Fisher's exact probability * * * *
Type table order

				E	6.1729	IJ	5.6763	SJ	0.5687	IN 10.4603
23.3795	0.3263	1.9010	1.7145	I	6.1729	IP	0.5633	SP	27.7862	EN 12.7977
				S	29.9164	EP	0.4662	NP	15.4858	IS 32.1761
7.1451	4.2622	9.6735	0.0522	N	29.9164	EJ	10.2156	NJ	7.8864	ES 0.4489
				T	26.4633	ST	47.6136	TJ	4.8349	
25.6455	0.0082	7.8211	0.5693	F	26.4633	SF	1.4107	TP	14.8406	
				J	1.4763	NF	25.6813	FP	4.7664	
3081	13.6736	3.3914	0.7395	P	1.4763	NT	2.6822	FJ	14.4915	

Source of data

Form G
High School Students of Eastern North Carolina
Collected by F. Pitchford, S. Richardson, and others
East CArolina University

Group tabulated:

African-American High School Students Eastern North Carolina, 1990-91

N = 452

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type.
I = Self-selection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ #	ISFJ #	INFJ "	INTJ #
N= 54	N= 27	N= 6	N= 9
%= 11.95	%= 5.97	%= 1.33	%= 1.99
I= 1.47	I= 0.61	I= 2.44	I= 2.64
ISTP	ISFP	INFP	INTP *
N= 31	N= 32	N= 8	N= 19
%= 6.86	%= 7.08	%= 1.77	%= 4.20
I= 1.44	I= 1.03	I= 0.95	I= 3.40
ESTP *	ESFP	ENFP	ENTP *
N= 56	N= 42	N= 24	N= 24
%= 12.39	%= 9.29	%= 5.31	%= 5.31
I= 1.63	I= 0.79	I= 1.26	I= 3.20
ESTJ	ESFJ *	ENFJ	ENTJ *
N= 66	N= 26	N= 11	N= 17
%= 14.60	%= 5.75	%= 2.43	%= 3.76
I= 0.81	I= 0.29	I= 1.30	I= 2.90

		N	%	I
J	E	266	58.85	0.89 #
U	I	186	41.15	1.22 #
D I	S	334	73.89	0.85 *
G N	N	118	26.11	1.94 *
I T	T	276	61.06	1.40 *
N R	F	176	38.94	0.69 *
G O	J	216	47.79	0.80 *
V	P	236	52.21	1.31 *
P E	IJ	96	21.24	1.11
E R	IP	90	19.91	1.35 #
R T	EP	146	32.30	1.28 #
C S	EJ	120	26.55	0.65 *
E	ST	207	45.80	1.19 #
P	SF	127	28.10	0.59 *
T	NF	49	10.84	1.27
I E	NT	69	15.27	3.08 *
V X	SJ	173	38.27	0.69 *
E T	SP	161	35.62	1.15 "
S R	NP	75	16.59	1.85 *
A	NJ	43	9.51	2.13 *
J V	TJ	146	32.30	1.14
U E	TP	130	28.76	1.88 *
D R	FP	106	23.45	0.95
G T	FJ	70	15.49	0.49 *
I S	IN	42	9.29	2.11 *
N	EN	76	16.81	1.86 *
G	IS	144	31.86	1.08
	ES	190	42.04	0.74 *

Table 7

Note concerning symbols following the selection ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Base population used in calculating selection ratios:
High-School Students, Other than College Prep, Fig. 4 ,p. 32 and Fig. 6 ,p. 34
Base total N = 3314. Sample and base are independent.

* * * * Calculated values of Chi-square or Fisher's exact probability * * * *
Type table order

				E 9.3352	IJ 1.1310	SJ 48.0675	IN 20.0247	
7.4403	6.6270	3.8637	6.8004	I 9.3352	IP 8.2339	SP 4.0553	EN 26.6620	
				S 49.9717	EP 10.4226	NP 25.7510	IS 1.1034	
3.6475	0.0328	0.0222	22.3236	N 49.9717	EJ 34.5939	NJ 21.0471	ES 36.4714	
				T 49.5546	ST 8.7872	TJ 3.2469		
12.1286	2.2952	1.1247	25.8037	F 49.5546	SF 63.5636	TP 51.5887		
				J 24.7677	NF 2.6967	FP 0.3104		
1.2464	52.5558	0.6627	15.3969	P 24.7677	NT 72.9391	FJ 50.9044		

How to interpret MBTI statistics tables

Rules

1. All statistics in the 16 cell grid and on the right side of the page refer to the population described at the top of the page.

2. The keys (", *, & #) for statistical significance are listed at the bottom of the page.

3. When I is statistically significant and larger than 1.0, that MBTI 4-letter type is more represented in the population listed at the top of the page.

4. When I is statistically significant and smaller than 1.0, that MBTI 4-letter type is less represented in the population at the top.

5. When no level of significance is indicated by I, (no ", * or #), there is no difference in the two populations.

6. The row of letters on the right side of the page shows statistical difference in one or two letter combinations, as indicated by ",*, or #. This row, again, refers to the population listed at the top of the page.